

Name \_\_\_\_\_

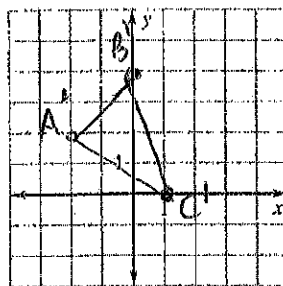
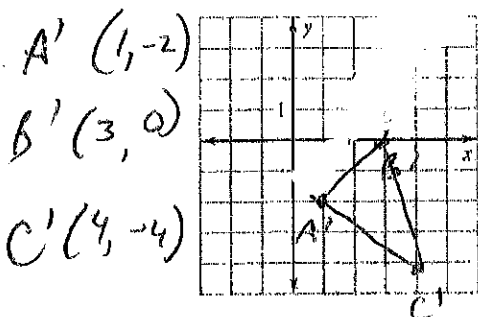
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# **Chapter 9** **Chapter Test A** For use after Chapter 9

The vertices of  $\triangle ABC$  are  $A(-1, 1)$ ,  $B(1, 3)$  and  $C(2, -1)$ .  
Graph the image of the triangle using prime notation.

1.  $(x, y) \rightarrow (x + 2, y - 3)$

2.  $(x, y) \rightarrow (x - 1, y + 1)$



**Answers**

1. See left.

2. See left.

3.  $(x, y) \rightarrow (x + 1, y - 2)$

4.  $(x, y) \rightarrow (x - 3, y + 2)$

5.  $[11, 6]$

6.  $\begin{bmatrix} -4 & 2 \\ -6 & 2 \end{bmatrix}$

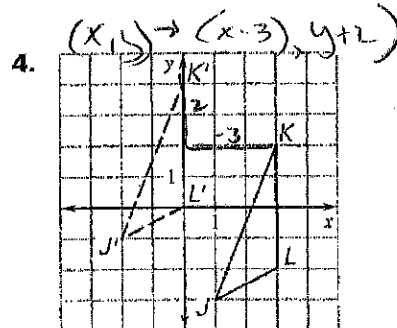
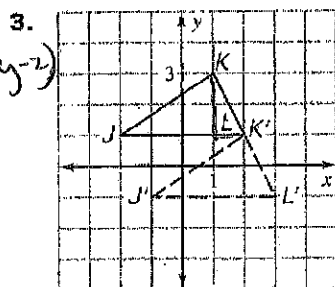
7. skip

8.  $[42]$

9. \_\_\_\_\_

10. \_\_\_\_\_

$\triangle J'K'L'$  is the image of  $\triangle JKL$  after a translation. Write a rule for the translation.



Add, subtract, or multiply.

5.  $\begin{bmatrix} 4 & 1 \\ 7 & 5 \end{bmatrix}$

6.  $\begin{bmatrix} -3 & 2 \\ 1 & 6 \end{bmatrix} - \begin{bmatrix} 1 & 0 \\ 7 & 4 \end{bmatrix}$

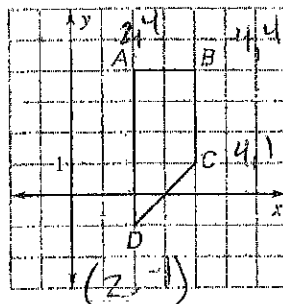
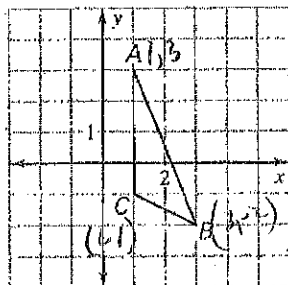
7.  $\begin{bmatrix} 3 & -6 \\ 8 & -5 \\ -2 & 1 \end{bmatrix} + \begin{bmatrix} -4 & 5 \\ 10 & 7 \\ -1 & -1 \end{bmatrix}$

8.  $\begin{bmatrix} 8 & 2 \\ 3 & 9 \end{bmatrix} \begin{bmatrix} 3 \\ 9 \end{bmatrix} = 24 + 18 = 42$

Find the image matrix that represents the polygon shown after a reflection in the given line.

9. x-axis

10.  $y = x$



$\begin{bmatrix} A' & B' & C' & D' \\ 4 & 4 & 1 & -1 \\ 2 & 4 & 4 & 2 \end{bmatrix}$

$\begin{bmatrix} 10 \\ 0-1 \end{bmatrix}$

$\begin{bmatrix} A' & B' & C' \\ 1 & 3 & 1 \\ -3 & 2 & 1 \end{bmatrix}$

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CHAPTER  
9

# Chapter Test A continued

For use after Chapter 9

Rotate each figure the given number of degrees counterclockwise about the origin. List the coordinates of the vertices of the image.

Answers

$(a, b) \rightarrow (-b, a)$  11.  $90^\circ$

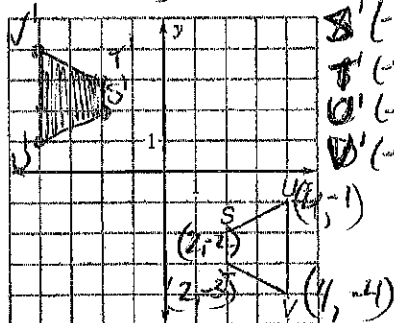
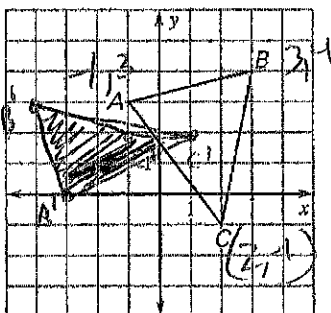
12.  $180^\circ (a, b) \rightarrow (-a, -b)$

11. \_\_\_\_\_

$A'(-3, -1)$

$B'(-4, 3)$

$C'(1, 2)$



$S'(-2, 2)$

$T'(-2, 3)$

$U'(4, 1)$

$V'(-4, 4)$

12. \_\_\_\_\_

13. \_\_\_\_\_

14. \_\_\_\_\_

In Exercises 13 and 14, the vertices of  $\triangle ABC$  are  $A(-4, 4)$ ,  $B(-1, 2)$ , and  $C(-4, 1)$ . Find the vertices of  $\triangle A'B'C'$  after a composition of the transformations in the order they are listed.

13. Translation:  $(x, y) \rightarrow (x + 3, y - 2)$

Translation:  $(x, y) \rightarrow (x - 1, y + 4)$

14. Translation:  $(x, y) \rightarrow (x + 2, y + 1)$

Reflection: in the  $x$ -axis

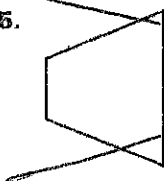
15. \_\_\_\_\_

16. \_\_\_\_\_

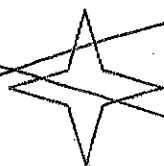
17. \_\_\_\_\_

How many lines of symmetry does the figure have?

15.



16.



17.



18. \_\_\_\_\_

19. \_\_\_\_\_

20. \_\_\_\_\_

Simplify the product.

18.  $4 \begin{bmatrix} 2 & -12 \\ -5 & 16 \end{bmatrix} \begin{bmatrix} 8 & -48 \\ -20 & 64 \end{bmatrix}$

19.  $-2 \begin{bmatrix} -1 & -7 \\ -3 & 10 \\ 8 & -13 \end{bmatrix}^3 \begin{bmatrix} 2 & 14 \\ 6 & -20 \\ -16 & 26 \end{bmatrix}$

21. \_\_\_\_\_

The vertices of  $\triangle PQR$  are  $P(-4, 3)$ ,  $Q(-1, 4)$ , and  $R(-2, -1)$ .

Find the vertices of  $\triangle P''Q''R''$  after a composition of the transformations in the order they are listed.

20. Translation:  $(x, y) \rightarrow (x + 3, y + 1)$

Dilation: centered at the origin with a scale factor of 2

21. Dilation: centered at the origin with a scale factor of 3

Reflection: in the  $y$ -axis

# Isometry

1. Copy and complete: A(n) isometry is a transformation that preserves lengths.

Match the point with the appropriate name on the vector.

4. T B

A. Initial point

5. H A

B. Terminal point



## EXERCISES

6. The vertices of  $\triangle ABC$  are  $A(2, 3)$ ,  $B(1, 0)$ , and  $C(-2, 4)$ . Graph the image of  $\triangle ABC$  after the translation  $(x, y) \rightarrow (x + 3, y - 2)$ .

6.  $A'(5, 1)$  Graph

$B'(4, -2)$

7. The vertices of  $\triangle DEF$  are  $D(-6, 7)$ ,  $E(-5, 5)$ , and  $F(-8, 4)$ . Graph the image of  $\triangle DEF$  after the translation using the vector  $(-1, 6)$ .

$C'(1, 2)$

## EXERCISES

Find the image matrix that represents the translation of the polygon. Then graph the polygon and its image.

8.  $\begin{bmatrix} A & B & C \\ 2 & 8 & 1 \\ 4 & 3 & 2 \end{bmatrix}$

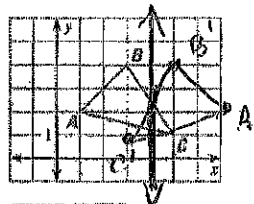
5 units up and 3 units left

$\begin{bmatrix} A' & B' & C' \\ -1 & 5 & -2 \\ 9 & 8 & 7 \end{bmatrix}$

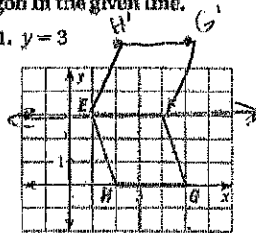
Graph

Graph the reflection of the polygon in the given line.

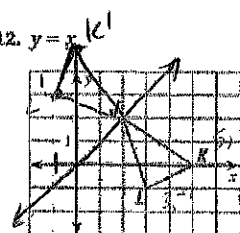
10.  $x = 4$



11.  $y = 3$



12.  $y = x$



## EXERCISES

Find the image matrix that represents the given rotation of the polygon about the origin. Then graph the polygon and its image.

$(a, b) \rightarrow (b, -a)$

14.  $\begin{bmatrix} L & M & N & P \\ -1 & 3 & 6 & -2 \\ 6 & 5 & 0 & -3 \end{bmatrix}; 270^\circ$

$\begin{bmatrix} L' & M' & N' & P' \\ 6 & 5 & 0 & -3 \\ 1 & -3 & -6 & 2 \end{bmatrix}$

## EXERCISES

Find the image matrix that represents a dilation of the polygon centered at the origin with the given scale factor. Then graph the polygon and its image.

20.  $\begin{bmatrix} Q & R & S \\ 2 & 4 & 8 \\ 2 & 4 & 2 \end{bmatrix}; k = \frac{1}{4}$

$\begin{bmatrix} Q' & R' & S' \\ \frac{1}{2} & 1 & 2 \\ \frac{1}{2} & 1 & \frac{1}{2} \end{bmatrix}$

21.  $\begin{bmatrix} L & M & N \\ -1 & 1 & 2 \\ -2 & 3 & 4 \end{bmatrix}; k = 3$

$\begin{bmatrix} L' & M' & N' \\ -3 & 3 & 6 \\ -6 & 9 & 12 \end{bmatrix}$